REMARKS/ARGUMENTS

Reconsideration and allowance in view of the foregoing amendment and the following remarks are respectfully requested.

Claims 1-2, 8-13, 19-42 are now pending. Applicant notes with appreciation the Examiner's indication that claims 23-32 are allowed. It is respectfully noted that claims 34-38 depend from allowable claim 23 and should therefore be allowable as well.

Claims 1-2, 8-13, 19-22 and 33-38 [sic] were rejected under 35 USC 103(a) as being unpatentable over Kawamura et al. (As noted above, claims 33-38 depend from allowed claim 23 and are therefore allowable and should not have been included in the rejection.)

The rejected claims have been amended and supplemented in some cases to be more specifically directed to one mode of the invention, to even more clearly distinguish from Kawamura. In this regard, the rejected claims have been amended to provide more specifically that in an example embodiment of the invention, the amount of ignition energy supplied to the spark plug from the ignition coil or the ignition power supply is less than/below 17mJ. In this regard, reference is made to the original specification, in particular page 16, lines 13-20, and page 17, lines 8-13, for example. The inventors' discovery also yielded the new limitation that a density of ignition energy is less than 32 W, which is also a new finding based on the inventors' recognition that the energy consumed as cooling loss by the ignition plug electrodes depends on the dimensions of the electrodes. Thus, the present invention as recited in the amended claims is able to provide the total amount of energy necessary for the electrodes as well as the density of energy necessary therefor.

The instant invention as recited in the above-amended claims is based on the inventors' study of the relationships between the dimensions of both the center electrode and the earth electrode of an ignition (spark) plug and an amount of energy

necessary for igniting the fuel-air mixture. The inventors' study lead to finding an amount of energy that should be supplied to a spark plug whose electrodes are made more compact. This saves power consumption and allows the ignition power supply to be more compact.

It is respectfully submitted that Kawamura does not teach or suggest the invention recited in the claims presented. In this regard, in Kawamura et al., to prevent the electrodes of an ignition plug from weakening, the ignition plug is given a larger value (50 to 200 kilo-ohms) of inner resistance by resistor 10 (see Fig. 1 and the disclosure in the specification at col. 3, lines 58-60). The larger-value inner resistance is deliberately set by Kawamura to consume energy (35 mJ; see Fig. 5) that is supplied from an ignition power supply. Hence this larger-value inner resistance simply serves as means for preventing the electrodes from weakening. As will be appreciated, Kawamura's teachings are thus totally different from the concept of the present invention as disclosed and claimed. It is further respectfully submitted that, in contrast to the present invention, Kawamura does not teach or suggest and would not apparently realize both saved power consumption and more compact ignition power supply.

Indeed, Kawamura complete fails to teach or suggest in the combination claimed the energy amount as low as recited in applicants' above amended claims and thus does not teach or suggest an energy amount lowered to the extent proposed by the invention and the density of energy consumed by the electrodes of an ignition plug.

It is therefore respectfully submitted that in the absence of applicant's disclosure, one skilled in the art would not derive from Kawamura a teaching or suggestion, or even a hint, of the structure of the claims presented in this application.

Reconsideration and allowance of the claims presented is therefore respectfully requested.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect is earnestly solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

Michelle N. Lester
Reg. No. 32,331

MNL:slj
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100